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SECTION I.—AEROLOGY.

SOLAR AND SKY RADIATION MEASUREMENTS
DURING DECEMBER, 1917.

By HERBERT H. KIMBALL, Professor of Meteorology.

[Dated: Washington, D. C., January 28, 1918.]

For a description of instrumental exposures and an account of the methods of obtaining and reducing the measurements the reader is referred to the REVIEW for January, 1917, 45: 2.

The monthly means and departures from normal values given in Table 1 show that direct solar radiation averaged above normal intensity for the month at Washington and Madison, and slightly below at Lincoln and Santa Fe. At Madison an intensity of 1.49 calories, measured at noon of the 29th, slightly exceeds the highest previous December noon intensity at that station.

Table 3 shows only a slight departure from the normal radiation for the month at Madison and a deficiency of about 8 per cent at Washington.

For the year Madison shows an unimportant excess of 0.2 per cent, while Washington shows a deficiency of 5.6 per cent.

Skylight polarization measurements at Washington, on only two days when the ground was free from snow, give a mean of 51 per cent, with a maximum of 52 per cent on the 10th. At Madison observations on three days, with practically no snow on the ground, give a mean of 71 per cent with a maximum of 73 per cent on the 25th.

Corrections for Lincoln, Nebr.

As noted in the REVIEW for May, 1917, the instrumental constant for the Callendar recording pyrheliometer at Lincoln, Nebr., underwent a change commencing with August, 1916, due to improper treatment of the bridge wire on the register. Frequent comparisons are made between the Callendar and Marvin pyrheliometers by the method described and illustrated in the REVIEW for August, 1914, 42: 477.

The Marvin pyrheliometer was standardized by comparison with Smithsonian silver block pyrheliometer "S. I. No. 1," in July, 1915. It was recompared with "S. I. No. 1," in October, 1917. On this latter occasion it read 5 per cent higher than when standardized in 1915. The instrument is of the spiral ribbon type, and it seems probable that the low readings of summer as compared with winter may be due to impaired insulation between the successive layers of the nickel ribbon of which the resistance coil is made up, during the warm and comparatively moist weather of summer.

Besides comparisons with "S. I. No. 1," the extrapolation of measurements with the Marvin pyrheliometer at Lincoln to zero air mass and the comparison of the results with a like treatment of measurements at other stations, indicates that the Lincoln measurements were too high from December, 1916, to April, 1917, by at least 5 per cent, and they have been diminished by this amount before including them in computations of the monthly normals.

When thus corrected, the comparisons between Marvin and Callendar pyrheliometers give the following corrections to be applied to records, by the latter, of the total

solar and sky radiation for Lincoln, as published in this REVIEW:

MONTH.	CORRECTION.
1916.	Per Cent.
August	+ 2
September	+ 3
October	+ 5
November	+ 8
December	+ 8
1917.	
January	+ 8
February	+12
March	+16
April	+20

The above corrections will be applied to the daily totals for the months indicated, as published in this REVIEW, before employing the latter in the computation of daily normals and departures from normal (see Table 3) for 1918.

TABLE 1.—Solar radiation intensities during December, 1917.

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
	Air mass.									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
A. M.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Dec. 6.....			1.43							
10.....			1.36	1.36	1.15	1.06	0.98	0.93	0.87	
11.....			1.32	1.29	1.22	1.14	1.07	1.04	0.99	0.95
28.....				1.32	1.25					
30.....			1.46							
Monthly means.....			1.39	1.29	1.21	(1.10)	(1.02)	(0.98)	(0.93)	(0.95)
Departure from 10-year normal.....			+0.16	+0.15	+0.15	+0.12	+0.13	+0.16	+0.18	+0.32
P. M.										
Dec. 10.....				0.98	1.19	1.07				
15.....				0.89	0.89	0.85			0.63	
30.....				1.35	1.30	1.23	1.10	1.07	1.01	0.97
Monthly means.....				(1.18)	1.13	1.05	(1.10)	(1.07)	(0.82)	(0.97)
Departure from 10-year normal.....				+0.04	+0.08	+0.10	+0.21	+0.21	+0.03	+0.22

Madison, Wis.

A. M.										
Dec. 6.....				1.42						
21.....				1.42						
22.....					1.02	0.96	0.89	0.82	0.76	
25.....				1.44						
29.....				1.49	1.41	1.36	1.29	1.23		
Monthly means.....				1.44	(1.22)	(1.16)	(1.09)	(1.02)	(0.76)	
Departure from 8-year normal.....				+0.15	+0.01	+0.01	-0.05	-0.03	-0.16	
P. M.										
Dec. 14.....					1.42	1.34	1.28	1.21		
21.....					1.36	1.32	1.27	1.18		
29.....					1.44	1.38	1.25			
Monthly means.....					1.41	1.35	1.27	(1.20)		
Departure from 8-year normal.....					+0.11	+0.16	+0.15	+0.08		

TABLE 1.—Solar radiation intensities during December, 1917—Continued.

[Gram-calories per minute per square centimeter of normal surface.]

Lincoln, Nebr.										
Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
	Air mass.									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
A. M.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Dec. 8.				1.42	1.38	1.23	cal.	cal.	cal.	cal.
11.				1.28	1.21	1.12	1.02			
16.				1.30	1.19					
20.				1.20	1.15	1.07	0.99	0.93	0.86	0.80
27.				1.08		0.81				
Monthly means				1.25	1.23	1.06	(1.00)	(0.93)	(0.86)	(0.80)
Departure from 3-year normal				-0.04	-0.01	-0.06	-0.01	-0.03	±0.00	
P. M.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Dec. 8.				1.24	1.20	1.15				
18.				1.10	1.06					
27.				0.98	0.95	0.92	0.89	0.85		
Monthly means				(1.15)	1.11	1.07	(1.04)	(0.89)	(0.85)	
Departure from 3-year normal				-0.12	-0.08	-0.06	-0.05	-0.16	-0.13	

Santa Fe, N. Mex.

A. M.										
Dec. 7.				1.39						
20.			1.47	1.36	1.32	1.27	1.22			
27.			1.46	1.38	1.30					
28.			1.46	1.39	1.33	1.26	1.20	1.18	1.15	
29.				1.34	1.28	1.22	1.17	1.11		
Monthly means			1.46	1.37	1.31	1.25	1.20	(1.14)	(1.15)	
Departure from 6-year normal			-0.04	-0.05	-0.05	-0.05	-0.04	-0.03	-0.01	
P. M.										
Dec. 3.			1.43	1.36	1.30	1.23	1.18	1.14	1.08	
6.			1.46		1.20	1.21			0.99	
19.			1.50			1.26	1.25	1.17	1.10	
27.				1.36	1.31	1.24	1.17	1.10		
28.			1.47	1.38	1.28	1.26	1.18	1.11	1.04	0.97
31.							1.22	1.15		
Monthly means			1.46	1.37	1.27	1.24	1.20	1.13	1.05	(0.97)
Departure from 2-year normal				-0.22	-0.03	-0.01				

TABLE 2.—Vapor pressures at pyrheliometric stations on days when solar radiation intensities were measured.

Washington, D. C.			Madison, Wis.			Lincoln, Nebr.			Santa Fe, N. Mex.		
Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.
1917.	mm.	mm.	1917.	mm.	mm.	1917.	mm.	mm.	1917.	mm.	mm.
Dec. 9	0.74	1.07	Dec. 6	1.19	1.32	Dec. 8	0.41	0.74	Dec. 3	3.45	2.62
10	0.71	1.19	14	0.97	0.81	11	0.71	1.88	6	1.45	2.49
11	0.97	1.32	21	3.15	2.06	16	1.78	3.99	7	2.16	2.49
15	1.19	1.32	22	2.11	4.37	18	3.81	4.57	19	2.62	3.63
26	1.45	1.96	25	0.48	0.86	20	4.57	4.37	20	2.16	3.00
30	0.53	0.71	29	0.41	0.66	27	2.26	0.71	27	3.45	3.15
									28	3.15	2.87
									29	2.36	2.87
									31	2.26	3.15

TABLE 3.—Daily totals and departures of solar and sky radiation during December, 1917.

[Gram-calories per square centimeter of horizontal surface.]

Day of month.	Daily totals.		Departures from normal.		Excess or deficiency since first of month.	
	Wash- ington.	Madison.	Wash- ington.	Madison.	Wash- ington.	Madison.
1917.						
Dec. 1.	calories. 152	calories. 176	calories. -28	calories. 43	calories. -28	calories. 43
2.	248	58	70	-74	42	-31
3.	70	166	-106	35	-64	4
4.	24	93	-150	-37	-214	-33
5.	190	105	18	-25	-196	-58
6.	137	229	-33	99	-229	41
7.	74	166	-95	36	-324	77
8.	15	209	-152	79	-476	156
9.	288	199	123	69	-353	225
10.	272	219	108	89	-245	314
Dec. 11.	227	200	65	69	-180	383
12.	167	99	6	-32	-174	351
13.	60	209	-100	78	-274	429
14.	71	212	-89	80	-363	509
15.	221	160	62	28	-301	537
16.	115	132	-44	-1	-345	536
17.	130	171	-39	38	-374	574
18.	92	35	-67	-99	-441	475
19.	66	34	-93	-100	-534	375
20.	184	26	25	-109	-509	266
Decade departure.					-264	-48
Dec. 21.	197	191	38	56	-471	322
22.	208	112	48	-24	-423	298
23.	207	20	47	-116	-376	182
24.	109	86	-51	-51	-427	131
25.	20	198	-140	61	-567	192
26.	218	121	58	-17	-509	175
27.	171	41	10	-98	-499	77
28.	168	98	7	-42	-492	35
29.	122	211	-39	70	-531	105
30.	268	59	107	-83	-424	22
31.	190	161	28	18	-396	40
Decade departure.					+113	-226
Excess or deficiency since first of year.	cal				-7,164	+187
per cent.					-5.6	+0.2

LUNAR TOTAL ECLIPSE, 1917, JULY 4.¹

By L. PICARD.

[Reprinted from Science Abstracts, Sect. A, Dec. 31, 1917, § 1347.]

Observations by three persons during the lunar eclipse of 1917, July 4, at the Bordeaux-Floriac observatory, indicated that the edges of the moon's limb appeared much brighter than the central portions. Also that the northern limb appeared much brighter than the southern, the moon passing to the north of the axis of the shadow cone; and that the western limb was most luminous until the middle of the eclipse, and the eastern limb during the second half of the eclipse. These facts indicate that the phenomenon is due to the solar rays being refracted on passage through the terrestrial atmosphere.—C. P. B[uller].

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LUNAR TOTAL ECLIPSE OF DECEMBER 27-28, 1917, AT HONOLULU.

By C. A. REICHEL, Assistant Observer.

[Dated: Weather Bureau Office, Honolulu, Hawaii, Dec. 30, 1917.]

A total eclipse of the moon, remarkable for the brightness of the moon during the eclipse period and also for the attending coronæ visible, was observed at Honolulu, Hawaii, on the night of December 27, 1917.

The eclipse as seen by the naked eye began at about 9:35 p. m. (157° 31' meridian time), was total from 11:10

¹ Comptes rendus, Paris, Aug. 13, 1917, 165:264.